



→ !! → L 5LR L *UDQH D L 6XWH L + !! !! L
\$XWLQJ L 7; L → - → !! ¶ L
3KRQH L ♂ ↑ ¶ L + T → + + → ← L
ZZZ HQLURQPHQDOLQHJULM HUW

L

1RYHPEHU L + ♂ L + !! ¶ T + L

0V L %ULGJHW L & L %RKDF L L L L L L L L

&KLHI L &CHUN L 0&+ ¶ !! ↑ L

7H[DVL &RPPLWLRQ L RQ L (QYLURQPHQDOL 4XDOLW L

3L 2L %R[L ¶ T !! ← → L

\$XWLQJ L 7H[DVL → ← → ¶ ¶ + T !! ← → L

KMSV L ZZZ WHT WH[DVL JRY DEXW L FRPPHQW KMP9LD L (CHWURQFL)LOLQJ L

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5H L 3XEOLF L &RPPHQW L RQ L 'UDW 5HQHZDO L 7LWCH L 9 L 3HPLW L 1R L 2¶ ↑ L \$XKRUL]LQJ L
RI L WKH L +DUULQWRLQ L 6ADWLRQ L 3RZHUL 3ODQW L

'HDL 0V L %RKDF L

(QYLURQPHQDOL ,QWJULW L 3URMHW L DQGL 61H2URPP8QEWUV ¥ □ L DSSUHFLDWHL WKLV L
RSSRUWQDW L WR L VXEPLW FRPPHQW L UHDUGLQJ L WKH L 7H[DVL &RPPLWLRQ L RQ L (QYLURQPHQDOL 4
♂ ≥ 7&(4 ¥ L RUL ≥ &RPPLWLRQ ¥ □ L 'UDW 7LWCH L 9 L 3HPLW L 1R L 2¶ ↑ L ♂ ≥ 'UDW 3HPLW L
RI L WKH L +DUULQWRLQ L 6ADWLRQ L 3RZHUL 3ODQW L ORFDWGL QHDL \$PDULOCR L LQ L 3RMWHL &RQW

7KH L +DUULQWRLQ L 6ADWLRQ L SRZHUL SODQW L L D L URXJKO \ L ¶ ♂ !! ↑ L PHJDZDW L FROO+
FRPSULVHG L RI L WKH L PDQ L FROO+ T L L HGL WWDPL ERLOHUV L ♂ GHMLJQDWGL DV L 8QWV L ¶ ♂ L L
HOHWULF L JHQHWDWLRQ L HTXLSPHQW L L \$FFRUGLQJ L WR L WKH L 'UDW 5HQHZDO L 7LWCH L 9 L 3HPLW L
RI L DLUL SROOXWDQW L TURP L WKH L +DUULQWRLQ L SODQW L DUH L DXKRUL]HGL E\ L WZR L PDWRUL 3UHMQW
'WHULRUWLRQ L ♂ ≥ 36' ¥ □ L DLUL SHUPLW L ♂ 3HPLW L 1R L 36'7; T + ¶ 0¶ ↑ ¶ T ← ← ♂ L
DWRFLDWGL ZLWK L 8QWV L ¶ ♂ L DQGL 3HPLW L 1R L 36'7; !! ¶ → 0 L ↑ ¶ T + ¶ ♂ L DXKRUL]LQJ L
ZLWK L 8QWV L L DQGL T □ L \$FFRUGLQJ L WR L WKH L 'UDW 3HPLW L HPLWLRQ L DUH L DOVR L
DGGWLRQDO L PLQRUL QHZ L VRXUFH L UYHLHZ L SHUPLW L DV L ZHOO L DV L WKURXJK L ¶ T L FODLPW
♂ ≥ 3/5 ¥ □ L 6H L 1HZ L 6RXUFH L 5HYLHZ L \$XKRUL]DWLRQ L 5HIIHUHQFH L WDEOH L 5HQHZDO L

7KH L 'UDW 3HPLW L LV L GHILFLHQW L HFDXW L

\$L W L 2PLW L (OLPLQDW L RUL :HDN HQV L \$SSOLFDEOH L 5HTXLUHPHQW L L L

%L QFRUSRUDWLRQ L E\ L 5HIIHUHQFH L RI L \$SSOLFDEOH L 5HTXLUHPHQW L)DLOV L WR L \$WXUH L &R
DQGL

&L W L)DLOV L 7R L \$WXUH L &RPSOLDQFH L :LWK L \$SSOLFDEOH L 5HTXLUHPHQW L
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&RQMLVWHQWL ZLWK^L 7LWH^L 9^L RI^L WKH^L &CHDQL \$LU^L \$FW^L L ZH^L UHSHFWXOO\^L DVN^L WKH^L
'LUHFWRU^L WR^L FRUHFWRU^L WKHM^L GHILFLHQFLHV^L DQG^L UHVSROGL WR^L RXUL FRPPHQWL EHIRUH^L ILQDC
WKH^L 'UDW^L 3HUPDW^L

← / (*\$/ ⊥ %\$&.*5281' ⊥ ⊥

&RQJUHWL FUHDWGL WKHL &CHDQL \$LUU \$FWAVL 7LWCHL 9L RSHUDWLQJL SURJUDPL WRL ≥HODE
6LWHLWML (3\$Q L DQGL WKHL SXEOLF L WRL XQGHUWDLQGL EHWWHL WKHL UHTXLUHPHQWL WRL ZKLFKL ◀
DQGL ZKHQWKHU L WKHL VRXUFHL LV L PHWGLQJ L WKRMH2SHUJLQPHGJLQH3AULVLA SURJUDPL → L)HG L 5HJL L
T L L ↑ !! Q L T L L ↑ ¶ L σ -KO\ L + ¶ Q L ¶ L □ L %HIRUHL WKHL 7LWCHL 9L SHUPLW
,PSCHPHQWDLRQL 30DQVL σ ≥ 6,3V¥ □ L SURYLGHL WKHL SULPDUU L EDMLVL IRU L HQIRUFHPHQWL RI L
6,3L UHTXLUHPHQWL DUH L RMHQ L WDWGL LQ L JHQHUDO L WHUPV L LW L LV L QRWL DCZDVL FODUL K
DSSOL L WRL SDUWLFODUL VRXUFHML L L \$GGLWLQDQO\ Q L LW L LV L RMHQ L GLI L FXOW L WRL GHWHUPLQ
DSSOL L WRL D L SDUWLFODUL VRXUFHML L EHFDXVL DSSOLFDECHL UHTXLUHPHQWL DUH L VSUHDGL DFURW
UXOHVL DQGL SUHFRQWUXFWL RQL SHUPLWML L L L

7KH^L 7LWH^L 9^L SURJUDPL ZDV^L PHDQW^L WR^L FRXQWHUDFWL WKLV^L SUREOHP^L E\ L FRPSLOLQJ
GRFXPHQW^L DOL^L WKH^L DSSOLFDEOH^L UHTXLUHPHQW^L IRU^L HDFK^L PDMRU^L VRXUFH^L 8 6
&RPPROZDOWK^L RI^L 9LUJLQD^L Y^L %URZG^L G^L ← + ⋆ L ← → T^L ⋆ WK^L &LUK^L ¶
WR^L LPSOHPHQWDLRQ^L RI^L WKH^L \$FW^L LW FRQNDQW^L LQ^L D^L VLQJOH^L FRPSUHKHQLYH^L VHW R
UHTXLUHPHQW^L UHCHMDQW^L WR^L WKH^L SDUWLFXODUL VRXUFH^L ¥ □ ← L L :KHUH^L DSSOLFDEOH^L UHTXLUHP
JHQHUDO^L WHUPV^L 7LWH^L 9^L SHUPLW^L PRXW^L DSSO\ WR^L D^L SDUWLFXODUL VRXUFH^L
↑ → L)HG^L 5HJ^L ↑ ↓ ↑ ¶ ← L L L

7LWCH^L 9^L SHUPLW^L PXWL^L DOVR^L LQFOXGH^L PRQLWRULQJ^Q^L UHFRUGHSLQJ^Q^L DQGL UHSR
VXIILFLHQW^L WR^L DWXUH^L RQJRLQJ^L FRPSOLDQFH^L ZLWK^L HDFK^L DSSOLFDEOH^L UHTXLUPHQW^L DQGL PDV
ULJKW^L RI^L UHJXODWRUV^L RU^L WKH^L SXEOLF^L WR^L UHD^L RQL DQ^L FUHGLEOH^L HYLGHQFH^L WR^L GHPRQW
ZLWK^L DSSOLFDEOH^L UHTXLUH~~SHUPLW~~^L &OXE^L Y^Q^L (3\$^L)◀^L GL^L ▶^L →^L Q^L ▶^L →^L +^L →^L ♂^L '◀^L
7LWCH^L 9^L GLG^L PRUH^L WKDQ^L UHTXLUH^L WKH^L FRPSOLDWRQ^L LQ^L DL^L VLQJH^L GRFXPHQW^L RI^L H[^L WLQ^L
OLPLW^L ◀^L L^L ◀^L L^L ◀^L L^L ,W^L DOVR^L PDQGDWGL^L WKDW^L HDFK^L SHUPLW^L ◀^L L^L ◀^L L^L VKDOOL^L VHW^L IR
FRPSOLDQFH^L ZLWK^L WKH^L SHUPLW^L WHUPV^L DQG^L 2ERQGLWRQDQJLQ^Q^L LQ^L 3DUW^L DQGL 'HQ\LQJ^L LQ^L 3DU^L
3HWAUWRQ^L IRU^L 2EMHWLRQ^L VAR^L 3QW^L WKH^L ODWHU^L RI^L 6RXWZHWLHQ^L (OHFWULF^L 3RZHUL^L &RPSDQ^L 2
3RZHUL^L 3ODQW^Q^L 2UGHU^L RQ^L 3HWAUWRQ^L 1R◀^L 9,+^L !! ♀+^L !! ♀^L DW^L ♀^L ♂^L)HEUXDU^L -
♂ ≥&RQLW^L WRQ^L ZLWK^L WKH^L &\$^Q^L WKH^L (3\$^L W^L DQGL FLWLJHQ^L FDQL XVH^L DQ^L FUHG^L
FRPSOLDQFH^L DQGL QRQ^L FRPSOLDQFH^L ZLWK^L WKH^L &\$^Q^L LQFOXGLQJ^L FRPSOLDQFH^L DQGL QRQ^L FRPSOLDQFH^L DQGL QRQ^L
W^L 9^L SHUPLW^L ¥^L

7KXV~~Q~~ L 7LWCH L 9 L SHUPLWV L PX~~V~~~~W~~ DS~~S~~~~O~~X~~B~~E~~O~~H L UHTXLUH~~P~~H~~Q~~W~~Q~~ L LQFOXGLQJ~~Q~~ L EXW L QRW L
WR~~Q~~ L 6ADWHL , PSCHPHQW~~N~~DLRQ L 3DQL UHTXLUH~~P~~H~~Q~~W~~Q~~ L L \$M~~H~~UL W~~K~~H L 7LWCH L 9 L SHUPLWV L QJ L SUR
≥ 6,3>V@ L UHPDLQ~~H~~Q L W~~K~~H L EDVLV L IRU L GHPRQW~~N~~DLQJ L DQG L HQMXULQJ L DWADLOPHQW L DQG L PD
QDWLRQDO L DLU L L TXDOLW L WWDQGDUGV~~Q~~ ¥ L EXW L 7LWCH L 9 L SHUPLWV L EHFD~~P~~H L W~~K~~H L SULPDU\ L
FRPSOLDQFH L ZLWK L UHTXLUH~~P~~H~~Q~~W L LQ L W~~K~~H L 6,3 L IRU L PD~~M~~RU L VRXUFH~~W~~ L L ↑ → L)HG L 5HJ L

PXW^L LQFOXGH^L DQG^L DWWXUH^L FRPSOLDQFH^L ZLWK^L PDMLU^L DQG^L PLQRU^L QHZ^L VRXUFH^L UHMLHZ^L SHUP
EXW^L QRW^L OLPLWHG^L WR^L 36' ^L SHUPLW^W_Q ^L DQG^L HQVXUH^L WKH^L%HWL^L \$YDLODEOH^L &RQWUROL^L 7
DQG^L RWKHU^L UHTXLUHPHQW^L HXWDEOLVKHG^L EV^L WKHMH^L SHUPLW^L DUH^L HQIRUPHDEOH^L L^L +!!^L &
,Q^L WKH^L ODWHU^L RI^L 6RWKZHWHUQL^L (CHFWULF^L 3RZHU^L &RPSDQ\Q^L +^L :^L 2UDNRYH^L R3RZHU^L 3
3HWLWLQ^L 1R^L 9,+ +!!^L ¶+ +!!^L ¶+ ^L)HEUXDU^L T^L !+!!^L ¶+ ^L DWL^L ← ^L ♂ ≥ :KHWKHU^L WKH^L
WKH^L%\$&7^L OLPLW^L LQ^L DL^L 36' ^L SHUPLW^L DUH^L DSSOLFDEOH^L UHTXLUHPHQW^L DOG^Q_W L^L WKH^L HIRUH^L
IRU^L LQ^L DL^L 71WCH^L 9^L SHUPLW^W ¥ ^L ^L L^L

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\$<L7KH< 'UDW< 3HUPW< 2PLWW< L (OLPLQDWHM< L RU< :HDNHQV< &HUWDLQ< \$SSOLFDEOH< 5HTXLUH

(DFK^L 7LWCH^L 9^L SHUPLW^L LWXHG^L E^L WKH^L 7&(4^L PXW^L LQFOXGH^L DQG^L DWXUH^L FRPSOLD
DSSOLFDECH^L UHTXLUHPHQW^L 8^L 6^L &^L Ü^L → | | ¶ F^L D^L 2PLWLQJ^L DSSOLFDEO
WKDW^L D^L FRXUW^L FRXOG^L PLWDNHQO\^L PROFOXGH^L WKDW^L WKLV^L RPLWLRQ^L UHQGHUV^L &HHMH^L OLPLW^L
8QLWHGL BWDWHV^L Y^L (0^L +RPHU^L &LW^L *HQHUDOLRQ)^L G^L → | | ¶ ! ! L^L G^L &LU^L
WKH^L &RXUW^L ODFNV^L MXULVGLFWLRQ^L WR^L HQIRUPH^L D^L UHTXLUHPHQW^L RPLWHG^L IURP^L D^L 7LWCH^L 9^L
L

7KH^L 'UDIW^L 3HPLW^L LV^L GHILFLHQW^L BHFDXVH^L LW^L IDLOV^L WR^L LQFOXGH^L DSSOLFDEOH^L 6ADW
3DQ^L $\delta \geq 6,3$ ¥ □^L UHTXLUHPHQW^L DQG^L UHTXLUHPHQW^L WKDW^L DUH^L SDUW^L RI^L WKH^L +DUULQJWRQ^L ;
6LJQLI LFDO^L 'WHWLRUDWLRQ^L $\delta \geq 36'$ ¥ □^L SHUPLW^L ,^L ,Q^L DGGWLRQ^L WKH^L 'UDIW^L 3HPLW^L
IDLOV^L WR^L LGHQWL^L RU^L LQFRUSRUDW^L E\^L UHIIHUHQFH^L DSSOLFDEOH^L UHTXLUHPHQW^L LQ^L IHHUDO
QHZ^L VRXUFH^L UHMLHZ^L SHUPLW^L LQFOXGLQJ^L OLPLW^L DQG^L RSHUDWLQJ^L FROGLWLRQ^L LQ^L +DUULQJWR
UHJLWUDWLQJ^L

¶◀7KHU 'UDWU 3HUPILW ,PSHUPILWLEO\ ([HPSAWL WKH +DWLQJWRQL 3ODQWL IURPL V
\$SSOLFDEOH 5HTXLUHPHQWL IRUL 3DUWLFXODWH ODWHU)RXQGL DW T !! L 7\$& L Ü L ¶ ¶
DQG 2SDFLW L IRXQGL DW T !! L 7\$& L Ü L ¶ ¶ ¶ ¶ ¶ Ø D□ L
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7KH^L 7H[DVL 6,3^L DOVR^L SURKLELW^L FRDO^L I LUHGL JHQHUDWRUV^L IURPL H[FHGLQJ^L DQL RSDF
+ !! L SHUHQW RU^L T !! L SHUHQW^L GHSHQGLQJ^L RQ^L WKH^L XQIWA^L GDWL RI^L FRQWUXFWLRQ^L
VL^L PLOWH^L H[FHSLRQ^L SHU^L KRXU^L RU^L VL^L KRXU^L ZLWKLQ^L D^L P !! L GD^L SHULRQ^L

2QFH^L DSSURYHG^Q L D^L 6ADWH^L ,PSCHPHQDWLRQ^L 3DQ^L EHFRPHV^L IHGHUDOL^L ODZ^Q L HQIRUFHDE
(3\$^Q) L DQG^L FLWLJHQW^L KLOH^L WKH^L &CDQ^L \$LU^L \$FW^L UHFRJQL^L]HV^L WKDW^L WADWHV^L ZLQO^L RMHQ^L QH
6,3V^Q L VXFK^L UHYLVLRQV^L PDI^L QRW^L EH^L HI IHFWHG^L ZLWKRW^L (3\$ 2V^L DSSURYDO^Q
L

>:@H^L QRMH^L WKDW^L WKH^L 6ANDWH^L FDQQRW^L LWXH^L DQ\ L 165 L 6,3 L SHUPLW^L WKDW^L KDV^L DL
OLPLW^L WKDQ^L DOUHDG\ L LV^L FRQWLQHG^L LQ^L WKH^L DSSURYHG^L 6,3 L)RU^L H[DPSOH^L WKH^L
165 L 6,3 L SHUPLW^L WKDW^L KDV^L OHW^L WAULQJHQW^L 9RCDWLCH^L 2UJDQLF^L &RPSRXQGV^L OLPLW^L V
&KDSWHU^L ¶ ¶ ↑ L DV^L DSSURYHG^L LQWR^L WKH^L 7H[DVL 6,3 L RU^L OHW^L WAULQJHQW^L 2[LGHV^L
OLPLW^L LQ^L &KDSWHU^L ¶ ¶ → L DV^L DSSURYHG^L LQWR^L WKH^L 7H[DVL 6,3 L L L 7KH^L 6ANDWH^L
SHUPLW^L WKDW^L PHHW^L DOO^L DSSOLFDEOH^L UHTXLUHPHQW^L RI^L WKH^L 7H[DVL 6,3 L L L , I^L W
D^L 165 L 6,3 L SHUPLW^L WKDW^L GRHV^L QRW^L PHHW^L WKH^L DSSOLFDEOH^L UHTXLUHPHQW^L RI^L WKH^L
DQ\ L VXF^L DOWHUQDWLYH^L OLPLW^L ZRXOG^L QHG^L WR^L EH^L VXEPLWWHG^L WR^L (3\$ L IRU^L DSSURYHG^L
VSHFLILF^L UHYLVRQ^L WR^L WKH^L 6,3 L EHIRUH^L WKH^L ZRXOG^L PRGLI\ L WKH^L IHGHUDOO\ L DSS
OLPLW^L LQ^L WKH^L DSSURYHG^L 6,3 L ¥ L L L

¶L T !! L 7\$& L Ü L ¶ ¶ ¶ ¶ ¶ D □ & ¶ & □ L
+ 8QLRQ L (AHL & R & Y(¶(3\$ L) < L G L ! ! T ¶ L ¶ ¶ L & WKL & LUK L ¶ → ↑ □ L & ≥ 8
D L WADWHL LPSCHPHQWDLRQ L SODQ L WKL UHTXLUHPHQW L WKHRI L KDH L WKH L TRUFH L DQG L HI I H
PDL L EH L HQIRUFH G L E L WKH L \$GPLQLWLDWRU L LQ L IHGHUDO L FRXUWA L ¥ □ & L
+ 8 6 & L Ü L → + ¶ !! & O □ L & ≥ (DFK L UHYLVLRQ L WR L DQ L LPSCHPHQWDLRQ L SODQ L VA
FKDSWHU L VKDOO L EH L DGRSWHG L E L VXFK L BWDWHL DWHUL UHDVRQDEOH L QRALFH L DQG SXEOLF L KDU
\$GPLQLWLDWRU L VKDOO L QRW L DSSURYH L DL UHYLVLRQ L RI L DL SODQ L LI L WKH L UHYLVLRQ L ZRXOG L LQ
DSSOLFDEOH L UHTXLUHPHQW L FRQFHQLQJ L DWDLOPHQW L DQG L UHDVRQDEOH L IXWKHU L SURJUHW L ◀ L &
DSSOLFDEOH L UHTXLUHPHQW L RI L WKH L FKDSWHU L □ L & !! L &) □ 5 L Ü L ↑ ¶ & ¶ !! ↑ L & ≥ 5H
WKHRI L ZLQ L QRW L EH L FRQMLGHUHG L SDJW L RI L DQ L DSSOLFDEOH L SODQ L XQALO L VXFK L UHYLVLR
E L WKH L \$GPLQLWLDWRU L LQ L DFFRUGDQFH L ZLWK L WKLV L SDJW L ¥ □ & L
+ 8 6 & L Ü L → + ¶ + L & ≥ ' L L DQ L HPLWLRQ L WADQGDUG L RU L OLPLWDWLQ L LV L LQ
LPSCHPHQWDLRQ L SODQ L VXFK L BWDWHL RU L SROLWFDOL VXEGLYVLRQ L PDL L QRW L DGRSWL RU L HQ
HPLWLRQ L WADQGDUG L RU L OLPLWDWLQ L ZKLFK L LV L OHW L WULQJHQW L WKDQ L > WKH L 6,30 & ¥ L

,GNDW^L↑ ← ☽ ↑ L ♂ HPSKDWLV^L DGHHG□◀ L

7KH^L &CHDQL \$LU^L \$FWL FOHDUO\ L IRUELGV\ WWDWHL TURP\ LWXLQJ\ SHUPLW\ HMQL SXU
DSSURYHGL SHUPLWLQJ\ SURJUDP\ WKDW\ PRGLI\ RUL ZHDNHQ\ 6,3\ UHTXLUHPHQW\ ZIWK\ UH
WWDWLRODU\ VRXUFH\ ZIWKRXW\ DSSURYDO\ RI\ WWDWLRODU\ WDQGDUGV\ DQG\ OLPLWDLRQ\ HWDEOLV
DV\ SDUW\ RI\ DL WWDWHDV\ 6,3\ UHPDLQ\ IHGHUDO\ HQIRUFHDEOH\ XQWLO\ (3\\$ DSSURYHV\ UHYL
7H[DV\ FDQQRW\ VLPSON\ DOWHU\ 6,3\ HPLWLRQ\ OLPLWW\ XQDHV\ DQG\ XQWLO\ WKH\ (3\\$ DSSUR
7H[DV\ ODFNV\ WKH\ DXWKRULW\ WR\ XQLODWHUDO\ DPHQGL\ LWL\ 6,3\ RUL ZHDNHQ\ 6,3\ OLPLW\ ZRXOG\ UHQGHU\ WKH\ IHGHUDO\ DSSURYDO\ SURFHV\ ODUWHO\ PHDQLQJCHW\ L

%XW L 7&(4 L GLGL MWL WKL ZKHQ L LW DGGHG L VR L FDQHGL ≥ 3DQHGL ODLQWHDQF
6KXWGRZQ ¥ L SURYLVRQV L WR L WKH L +DUULQJWRQ L SRZHU L SODQW V L WZR L PDWRU L QHZ L VRXUFH L UHM
QRZ L ZLWK L WKLV L 'UDIWL 3HUPIW L 7&(4 L LV L DWHPsalQJ L WR L LQFRUSRUDWH L WKRVH L LOOHUDO L
+DUULQJWRQ L SODQW V L 7LWH L 9 L SHUPIW L L 'RLQJ L VR L ZRXOG L YLRODWH L WKH L IHGHUDO L &HDQ
HOLPLQDWLQJ L H[LWAQJ L 6,3 L OLPLW L GXULQJ L SHURGV L RI L WADUWKS L VKXWGRZQ L DOQ PDLQW
DFFRPSOLVKHG L DV L DL VRXUFH VSHFLILF L 6,3 L UHMLVLRQ L WKL UHTXLUVH L (3\$ L DSSURYDO

↑L ♫ ↑ L 8◀ 6◀ &◀ L ÜL → + ¶ !! ♂ L□ L ♂ ≥ ([FHSL IRU L DL SULPDU\ L QRQI HURXV L VPHOWHUL R
WLMCHL D L VVSHQMLRQL XQGHUL VXEVFALRQL ♂ | □ L RU L ♂ J □ L RI L WKLV L VHFWLRQL ♂ UHODWLQJ
DQL H[FPSALRQL XQGHUL VHFWLRQL → + ¶ ← L RI L WKLV L WLMCHL ♂ UHODWLQJ L WR L FHJWDLQL)HCHUDC
XQGHUL VHFWLRQL → + ¶ ♂ G□ L RI L WKLV L WLMCHL ♂ UHODWLQJ L WR L FRPSOLDQFH L RUGHUV □ ♂ L D
VXEVFALRQL ♂ F□ L RI L WKLV L VHFWLRQL → RU L D L SODQL UHYLVLRLQ L XQGHUL VXEVFALRQL ♂ D□ ♂ T
VVSHQMLRQL SODQL UHYLVLRLQ L RU L RAKHUL DFALRQL PRGLI \ L QJ L DQL UHTXLUHPHQW RI L DQL DS
LPSODQWDWLRLQ L SODQL PD\ L EH L WDNHQ ZLWK L UHMSHFW L WR L DQL WADWLRCQJ L VRXUFH E\ L WKH L 6
\$GPLQLWLDWRUH \$S SURYDQ L DQG L 3URPXQJDWLRLQ L RI L , PSOHPHQWDWLRLQ L 30DQV L ([FHVL (PLWLRLQV
'XULQJ L 6ADWKS L 6KXWGRZQ L ODLOWHQDQFH L DQL ODOIXQFWIRQL)S6A1YHAWH L ← ♂ ← ♂ L
♂ 1RYHPEHUL ¶ !! ♂ ← !! ¶ !! ♂ ≥ +RZHMHU L ZH L QRWHL WKDW WKH L 6ADWHL FDQQRW L LWXH L
KDV L DL OHW L WUULQHJQW HPLWLRLQ L OLPLW L WKDQ L DOUHDG\ L LV L FRQNDLQHG L LQ L WKH L DSSURYHG
H6H L *HQHUDO L ORARU L &RUS◀ L Y◀ L \$◀ 6◀ 6◀ L ↑ T !! ♂ L ↑ + !! ♂ ♂ ¶ !! ♂ L ♂ FLWLQJ L
♂ ≥ 7KHUH L FDQL EH L OLMCHL RU L QR L GRXEW WKDW WKH L H[LWALQJ L 6,3 L UHPDLQV WKH L μ DSSOL
SODQD L HYHQ L DMHUL WKH L 6ADWHL KDV L VXEPLWHG L DL SURSRVHG L UHYLVLRLQ Y □ L + !! L &◀)
→ 6DIHL \$SLU L IRU L (YHURQH Y◀ L (3\$ + GL ¶ !! ← ← ♂ L ¶ !! → L ♂ WK L &LU L + !! → □◀
- 8QLWGL 6ADWHL Y◀ L 0XLSK\ 2LO L)◀ L 6XSS◀ L + GL ¶ !! ↑ + ♂ L 6HPL ! 6WHLWD L ¶ !! ♂ :◀ '◀
8OXE L Y◀ L 7HQQ L 9DQH L \$XAK! L)◀ T GL ¶ !! T → ♂ L ¶ !! + ↑ ¶ !! ♂ ♂ WK L &LU L + !!
H6H L H3KJCK\ L Y◀ L)RUG L ORARU L &RUS◀ L)◀ + GL ¶ !! ♂ L ¶ !! + L ♂ F WL &LU L ¶ !! ←
2UGHUL UHICFWL OLPLW L WKDW DUH L GLI HUHQW WKDQ L WKRWHL LQ L WKH L FXUHQW\ L DSSURYHG L
RUGHUL PXWW L EH L VXEPLWHG L WR L (3\$ L DV L DL UHYLVLRLQ L WADWLRCQJ)S6A1YHAWH L ¶ !! L)◀ T GL DW L ¶
+ → L ♂ ≥ 7KHUH L ♂ L GH L PLQLPLV L UXOH L > ZKLFK L SURYLGHG L DL VDIHL KOUERUL IURP L + !! ♂ L R
HPLWLRLQV L GR L QRW H[FHGL + ♂ L RI L VRXUFH\ @ V L TXDUWHJ L RSHUDWLQJ KRXU@ HIIHFALYHO
OLPLWDLRLQ L FRQNDLQHG L LQ L WKH L 6,3 ≤ DL UHYLVLRLQ E\ L DQL RAKHUL QDPH L L V L WLOO L DL UHYL
XQDSSURYHG L UHYLVLRLQ L RI L DQL SDUW L RI L DL 6,3 L L V L LQYDOLG L XQGHUL ÜL 8019HG L L Q L RI L
6ADWHL Y◀ L *HQHUDO L '\QDPH\ &RUS◀ L)◀ L 6XSS◀ L → + !! ♂ L → + + L ♂ 1◀ '◀ L 7H◀
HIIHFALYHO RI L WKH L DJUHHG L ERDUG L RUGHUL LV L WR L UDLVH L WKH L HPLWLRLQV L OLPLWDLRLQV L VHW E\

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7KH^L 'UDW^L 3HPLW^L LV^L 'HI LFLHQW^L LQ^L WKDW^L LW^L H[HP\$W]^L 8QLW^L ¶ ☀ L^L L^L L^L DQG^L T
WKH^L 30^L DQG^L RSDFLW^L OLPLW^L GHMULEHG^L DERYH^L LQ^L FCHDU^L YLRODWLRQ^L RI^L WKH^L 7LWH^L 9
DQO^L DSSOLFDEOH^L UHTXLUHPHQW^L DQG^L WR^L DAXUH^L FRPSOLDQFH^L ZLWK^L WKRWH^L OLPLW^L ¶ L^L
L

D◀ ,QFRUSRUDWLQJ L WKH L ≥ 6DUWXS L 6KXWGRZQ L DQG L ODLQWHDQFH ¥ L SURYLVLRQV L
+DULQWRQ L 3DQWV V L WZR L 36' L SHUPLW L LQWR L WKH L 7LWH L 9 L 3HUPIW L :RXOG L ,PSH
(OLPLQDWH L WKH L 6,3 L 2SDFLW L DQG L 3DUWFXODWH L ODWHU L /LPLWV L 'XULQJ L 7KHM L 3H

6,3^L OLPLW^L PDL^L RQO^L EH^L FKDQJHG^L WKURXJK^L WKH^L 6,3^L SURFHWA^L ZKLFK^L UHTXLUHV^L
(3\$^L UHYLHZ^L DQG^L DSSURYDO^L L^L L^L

L &RPPHQWUVL DFNQRZQHGUHQL DQGL DSSUHFLDWHQL WKDWL RWKHUL DSSOLFDECHL UHTXLUHPHQWL
HPLWLRQVL DQGL RSDFLW L KDYHL EHQL LQFRUSRUDWGL LQWL WKHL 'UDWL 3HUPLW L L %XW LQFR
UHTXLUHPHQWL GRHV L QRWL UHOLHMHL WKHL 6DWHL TURPL LQFOXGLQJ L WKHL RWKHUL DSSOLFDECHL UHT
H[DPSCHL ZH L DSSUHFLDWHL WKDWL WKHL 'UDWL 3HUPLW LQFRUSRUDWHL WKHL 8QLWL ¶ L L DQGL
PDWHL OLPLWVL FRQNDQHGL LQ L WKHL OD[LPXP \$OORZDECHL (PLWLRQL 5DWHL 7DECHVL LQ L WKHL U
SHUPLW L L 7KHMHL OLPLWVL URXJKO L FRUHMSRGVL WR L DQ L HPLWLRQL UDWL RI L !! ¶ L
PD[LPXP L ORDG L L 7KHL 'UDWL 3HUPLW IDLOV L WR L LQFOXGL PRQWRULQJ L VXI LFLHQWL WR L DW
WKHL 30 L KRXUO \ L ♂ 0\$(57 L OLPLW GLVFXWHGL LQ L PRUHL GHADLOL EHORZ L L 7KHL 6,3 L 30 L
RI L 30 L SHU L 00%WL LQFOXHVL WRADOL SDUWFXODWHL PDWHL ♂ ILOWHUECHVL DQGL FRQGHQMLECHM
DWL ORZL ORDG L L 7KHL 6,3 L 30 L OLPLW LV L WKHUHIRUHQL QRWL RQO L DQ L LQGHSHQHQWL DS
DOVRL PRUHL WULQJHQWL WKDQL RWKHUL 30 L OLPLWVL LQ L VRPHL ZDVLW L L :KHWKHUL RU L QRWL WKHL
DJUHHV L ZLWL &RPPHQWUVL WKDWL WKHL 6,3 L 30 L OLPLW LV L PRUHL WULQJHQWL LQ L VRPHL ZDVLW
UHTXLUHPHQWL LV L LUHOOHDQW L DV L WKHL ODZL UHTXLUHV L 7LWCH D09 L DS80PHECHWR L LQF
UHTXLUHPHQWL ¶ L L L L L

)RUL +DWLQJWRQ 8QLW ¶ 3HPLW 36'7; L + T ¶ 0¶ 6SHFLDO
LPShUPLWLEO\ H[HPSAWLWKH 8QLW IURPL FRPSOLQJ ZLWK ERWK WKH 30L DOGL RSDFLW L OLP
FRQNDLQHG LQ WKH 7H[DVL 6,3 L L L L 7KHMH L FKDQJHV L ZHUH DSSURYHG E\ L 7&(4L LQARL WK
SHUPLW ¶ L EXW WKH\ L ZHUH QHMHU L VXEPLWHL WR L (3\\$ L IRU L UHLYHZ L DOGL DSSURDO DV L UHT
+DWLQJWRQ 8QLW L + L DOGL T 3HPLW 36'7; !! ¶ → 0 L + L WKRXJK L VLQHQW RQL V

RUGHU^L UHTXLUH^V^L DSSURYDOL^{E\}^V^L < L < L < L >(3\$@ WR^L EH^L HI IHWLYH^K L L L 8QQHW^L DQGL^{XQ}
GHIHQGDQW^P PXW^W DEGH^L E\ WKH^L OLPLWDWLQV^R RI^L WKH^L 7H[DVL^{6,3} Ȑ ¥ □ < L

¶ 8◀ 6◀ &◀ Ü Ü L → 6HJ!! DOVR[↑] 5HJ◀ ♪ | ← ♪ L ← ♪ L ← ♪ ↑ L ♂ 1F
♂ ≥ ' DQI L VXFK L DOWHQDLYH L OLPLAW L ZRXOG L QHGL WR L EH L VXEPLWHL WR L (3\$ L IRU L DSS
VSHFL I LF L UHYLVLRQ L WR L WKH L 6,3^o L EHIRUH L WKH L ZRXOG L PRGLI A L WKH L IHGHUDO O L DSSOLFDEO
WKH L DSS RYHG L 6,3^o ¥ □ □ L

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OLPLW^W L KDV^L WKH^L VDPH^L HI^I HW⁻ RI^L HOPLOQALQJ^L WKHM^L OLPLW^L E\ L DXAKRUL]LQJ^L WKH^L DR
 RSDFLM^L DQG^L 30^L HPLWLRQ^L VSINHV^L ZIWKRXW^L UHJDUG^L WR^L WKH^L 6,3^L SURFH^M L L 6H^W L 6SH^W
 DQG^L ¶ + + ¶ → ◀ L L L L L
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7KH^L VXEWDQWLYH^L DQG^L SURFHGXUDOL^L SUHUTXLVW^W L IRU^L FKDQQLQJ^L 6,3^L RSDFLM^L OLPLW^L
 LQ^L T !! L 7\$& L Ü L ¶ ¶ ¶ ▲ ¶ ¶ T ◀ L L 7KDW^L UXOH^L UHTXLUV^L DQ^L ≥ DGXGLFDWLYH^L SXEOLF^L K
 OLPLW^L IRXQG^L DW^L T !! L 7\$& L Ü L ¶ ¶ ¶ ▲ ¶ ¶ σ D Q L FDQ^L EH^L DOWHUHG^W L DQG^L DXAKRUL]H
 WKDW^L FRQWLQXH^L WR^L PHW^L ≥ 'DOO^L DSSOLFDECH^L FRQFHQWLUDLRQ^L DQG^L PDW^L EDHG^L OLPLW^L ¥
 SROOXWDQW^W ¥ L L L 7KLV^L SURYLVLRQ^W L DOORZLQJ^L DQ^L DOWHUQDW^L RSDFLM^L OLPLW^L WR^L EH^L HW
 FLUFXPWWDQPHM^W L ZDV^L DSSURYHG^L E\ L (3\$^L DV^L SDUW^L RI^L WKH^L 7H[D^L 6,3^L LQ^L ¶ + + ◀ L L
 ← ♦ L ¶ + + ◀ L L 7KX^W L ZKLOH^L WKH^L 6ADW^L FDQ^L HXWDEOLVK^L DOWHUQDW^L 6,3^L RSDFLM^L
 WKH^L DSSURYHG^L 6,3^L SURFH^M L L L

+H^W L LQWHDGL^L RI^L IROORZLQJ^L WKH^L 6,3^L SURFH^M L IRU^L LQFHDMVQJ^L RSDFLM^L
 PDQWHDQFH^W L WDWW^W XS^L DQG^L VKXNGRZQ^L HYHQW^W L WKH^L 6,3^L RSDFLM^L OLPLW^L ZDV^L UHPRYHG^L
 36' L SHUPLW^L ZIWKRXW^L DQ\ L RSSRUWKQW^L IRU^L DQ^L DGXGLFDWLYH^L SXEOLF^L KHDLQJ^L UHTXLUV^L
 ¶ ¶ ¶ ▲ ¶ ¶ T ◀ L L 6H^W L 'UDW^L 3HUP^L DW^L SS^W L ¶ + + σ WDWW^W L WKDW^L 8QJW^L ¶
 DOWHUQDW^L RSDFLM^L OLPLW^L XQGHU^L T !! L 7\$& L Ü L ¶ ¶ T ◀ ¥ □ L

,QFRUSRUDW^HG^L 3HUP^L 1R^W L ¶ + + L 6SHFLDO^L &RQGLWLRQV^L ¶ + + L DQG^L + + L H[HPSW^L
 TURP^L FRPSOLDQFH^L ZIWK^L WKH^L 6,3^L RSDFLM^L OLPLW^L IRU^L XS^L WR^L + + L KRXUV^L GXULQJ^L QRUPDC^L
 T !! ! L KRXUV^L GXULQJ^L DQ^L HMWQGHG^L WDWW^W L ,W L H[HPSW^L 8QJW^L ¶ + + L TURP^L FRPSO\ LQJ^L ZI
 XS^L WR^L T + + L KRXUV^L GXULQJ^L D L VKXNGRZQ^W L DQG^L XS^L WR^L ¶ + + L KRXUV^L GXULQJ^L RQOLQH^L RU
 8QJW^L + + L DQG^L T ♦ L QFRUSRUDW^HG^L 3HUP^L ↑ ¶ + + ♦ L WKRXJK^L VLOHGW^L RQ^L WKH^L 6,3^L 30^L I
 VDPH^L LPSHUPLWLEOH^L HI^I HW⁻ L LW L H[HPSW^L WKH^L XQJW^L TURP^L DQ\ L HPLWLRQ^L OLPLW^L IRU^L
 KRXUV^W L L 6H^W L 3HUP^L ↑ ¶ + + ♦ L 6SHFLDO^L &RQGLWLRQV^L ¶ + + L σ DOORZLQJ^L XQOLPLW^HG^L HP
 GXULQJ^L D L ≥ SODQQHG¥ L WDWW^W L DQG^L XS^L WR^L + + !! ! L KRXUV^L GXULQJ^L DQ^L ≥ HMWQGHG^L SOD
 7KH^L VDEOH^L EHORZ^L FRPSDUHV^L WKH^L WDWW^W L RI^L T !! L 7\$& L Ü L ¶ ¶ T ◀
 ODQWHDQFH^W L WDWW^W L DQG^L 6KXNGRZQ^L σ ≥ 066¥ □ L SURYLVLRQV^L LQ^L WKH^L +DULQWRQ^L 8QJW^L
 SHUPLW^L σ ¶ + + L 36'7; + T ¶ + + L DQG^L ↑ ¶ + + L 36'7; !! ¶ + + O L □ L WKDW^L DUH^L EHLOJ^L LQ
 3HUP^L L L

T !! L 7\$& L Ü L ¶ ¶ T ◀	066 ^L 3HUP ^L &RQGLWLRQV ^L
\$XAKRUL]H ^L ≥ DOWHUQDW ^L RSDFLM ^L OLPLW ^L &RPSQWHLHXHORPLQDW ^L RSDFLM ^L UHTXLUVPHQW ^L RI ^L	
RSDFLM ^L UHTXLUVPHQW ^L RI ^L Ü L ¶ ¶ ¶ ▲ ¶ ¶ T ◀ EDHG ^L GXULQJ ^L 066 ^L HYHQW ^W L	
VSHFLILF ^L FULWUD ^W L	
5HTXLUV ^L ≥ DGXGLFDWLYH ^L SXEOLF ^L KHDLQJ ^L YDGXGLFDWLYH ^L KHDLQJ ^L SULRU ^L WR ^L DSSURYD ^W L	
KHDULQJ ^L UHFRUG ^W L	
\$WHUQDW ^L RSDFLM ^L OLPLW ^L DSSURYHG ^L FQFQPSCHW ^L ≥ DQPLQDW ^L 30 ^L FRQFHQWLUDLRQ ^L EDHG ^L	
DSSOLFDECH ^L FRQFHQWLUDLRQ ^L DQG ^L PDW ^L OLPLW ^L DQG ^L	
PHW ^L	

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7&(4^L PD\^L QRW\^L QFRUSRDW\^L WKH\^L SURYLVRQV\^L RI\^L WKH\^L +DUULQWRQ\^L SODQW\^AV\^L QHZ\^L VR
SHUPLW\^L ¶ T ← ← ↑ 36'7; † T ¶ 0¶ L UHDW\^LQJ\^L WR\^L SODQHG\^L PDLQWHDQFH\^L WDQW\^L XS\^L DQG\^L
WKH\^L LPSHULWLQ\^L H[HPSW\^L +DUULQWRQ\^L TURP\^L FRPSO\^LQJ\^L ZLWK\^L 6,3^L 30^L DQG\^L RSDFLW\^L OLP
IRU\^L 8QLW\^L + DQG\^L T ¶ 7&(4^L PD\^L QRW\^L QFRUSRDW\^L LQWR\^L WKH\^L 7LWCH\^L 9^L SHUPLW\^L WKR
1RK\^L 36'7; † T ¶ 0¶ ↑ ↑ ¶ L WKDW\^L ZXOG\^L KDYH\^L WKH\^L HI IHFW\^L RI\^L H[FXVLQJ\^L FRPSOLDQFH\^L
6,3^L RSDFLW\^L DQG\^L SDUWLFXODW\^L PDW\^LH\^L OLPLW\^L L L L

E◀ 7KH\^L 'UDIW\^L 3HUPW\^L 2PLW\^L WKH\^L 7H[DVL 6,3^L /LPLW\^L IRU\^L 3DUWLFXODW\^L ODWWHUL\^L)RXQ
7H[DVL \$GPLQ\^L &RGH\^L Ü L ¶ ¶ ¶ ¶ ↑ T ♂ E\^L TURP\^L WKH\^L \$SSOLFDECH\^L 5HTXLUHPHQ
DQG\^L WKH\^L 8QLW\^L 6XPPDU\^L 7DECHM\^L DQG\^L)DLO\^L WR\^L \$WXUH\^L &RPSOLDQFH\^L ZLWK\^L WKLV
L

,Q\^L WKH\^L VHFWLRQ\^L DERYH\^L ZH\^L H[SODLQHG\^L WKDW\^L WKH\^L 'UDIW\^L 3HUPW\^L LPSHULWLQ\^L
PDLQWHDQFH\^L WDQW\^LXS\^L VXXGRZQ\^L H[HPSWLRQV\^L WKDW\^L ZHUH\^L DGGHG\^L WR\^L WKH\^L SODQW\^AV\^L 36' L
SHUPLW\^L SURYLVRQV\^L KDYH\^L WKH\^L HI IHFW\^L RI\^L VXEWDQWLYHO\^L ZHDNHLQJ\^L DQG\^L HOLPLQDW\^LQJ\^L 6AD
30DQ\^L OLPLW\^L RQ\^L RSDFLW\^L DQG\^L SDUWLFXODW\^L PDW\^LH\^L IRU\^L XS\^L WR\^L KXQGUHG\^L RI\^L KRXUV\^L SHU
30^L OLPLW\^L IRXQG\^L DW\^L T !! L 7\$& L ¶ ¶ ¶ ¶ ↑ T ♂ E\^L LV\^L DOVR\^L PLWLQJ\^L TURP\^L ERWK\^L WKH\^L
\$SSOLFDECH\^L 5HTXLUHPHQW\^L 6XPPDU\^L 7DECHM\^L LQ\^L WKH\^L 'UDIW\^L 3HUPW\^L L L 'UDIW\^L 3HUPW\^L SS\^L
:H\^L DSSUHFLDW\^L WKH\^L IDFW\^L WKDW\^L WKLV\^L 30^L OLPLW\^L LV\^L LQFOXHG\^L LQ\^L WKH\^L WHWWDOL\^L QDUDALY
6H\^L 'UDIW\^L 3HUPW\^L &RQGLWLRQ\^L T ¶ '¶ L SS\^L + + ↑ + + L L L + RZHMHU\^L RPLWLQJ\^L WKH\^L
5HTXLUHPHQW\^L 6XPPDU\^L DQG\^L TURP\^L WKH\^L 8QLW\^L 6XPPDU\^L 7DECHM\^L FRXOG\^L EH\^L HDVLO\^L PLVLOWHUS
FRXOG\^L FDXMH\^L FRQIXVLRQ\^L ZKHQ\^L LW\^L FRPHV\^L WR\^L FRPSOLDQFH\^L L L 7R\^L FRUHW\^L WKLV\^L RPLWLQJ
IRXQG\^L DW\^L T !! L 7\$& L Ü L ¶ ¶ ¶ ¶ ↑ T ♂ E\^L VKRXOG\^L EH\^L DGGHG\^L WR\^L WKH\^L 'UDIW\^L 3HUPW\^L
FODULI\^L WKDW\^L WKLV\^L OLPLW\^L LV\^L DQ\^L DSSOLFDECH\^L UHTXLUHPHQW\^L L
ORUH\^L LPSRUWDQW\^L WKH\^L 'UDIW\^L 3HUPW\^L QHG\^L WR\^L DWWUH\^L FRPSOLDQFH\^L ZLWK\^L WKLV\^L OLPLW\^L
LW\^L DOVR\^L IDLOV\^L WR\^L GR\^L L 7KLV\^L GHILFLHQF\^L LV\^L GLVFXWHG\^L LQ\^L 6XEVHFWLRQ\^L & L EHORZ\^L

%◀ 7KH\^L 'UDIW\^L 3HUPW\^AV\^L ,QFRUSRDWLRQ\^L E\^L 5HIIHJQFH\^L RI\^L \$SSOLFDECH\^L 5HTXLUHPHQW\^L)
\$WXUH\^L &RPSOLDQFH\^L

&HDQ\^L \$LU\^L \$FW\^L 6HFWLRQ\^L ↑ !! + ♂ D\^L SURYLGHV\^L WKDW\^L HDFK\^L 7LWCH\^L 9^L SHUPLW\^L ≥VKD
HPLWLQ\^L OLPLW\^LWKDV\^L DQG\^L WDQGDUG\^L □ L □ L □ L DQG\^L RAKHUL\^L VXFK\^L FRQGLWLRQV\^L DV\^L D
FRPSOLDQFH\^L ZLWK\^L DSSOLFDECH\^L UHTXLUHPHQW\^L @¥ L L + + L 8◀ 6◀ & L Ü L → † † F♂ D\^L □ L
KDV\^L DOORZHG\^L WDQW\^L SHUPLW\^LQJ\^L DXWKRULWHV\^L WR\^L VDWLV\^L 6HFWLRQ\^L ↑ !! + ♂ D\^L E\^L L
UHTXLUHPHQW\^L LQWR\^L 7LWCH\^L 9^L SHUPLW\^L E\^L UHIIHJQFH\^L UDWHULWKDQ\^L UHSUQLQJ\^L WKH\^L HQ
DSSOLFDECH\^L UXOH\^L RU\^L RUGHUL\^L RQ\^L WKH\^L IDFH\^L RI\^L D\^L 7LWCH\^L 9^L SHUPLW\^L L L 7R\^L HQXUH\^L WKDW
UHIIHJQFH\^L ♂ ≥ ,%5 ¥ □ L ZLOO\^L QRW\^L WKZDUW\^L 7LWCH\^L 9 ØV\^L SROLF\^L REMHFWLYHO\^L L (3\$ L HW
WKUHMROGL\^L UHTXLUHPHQW\^L IRU\^L WKH\^L DFFHSWDECH\^L XVL\^L RI\^L ,%5 L

\$W\^L DL\^L PLQLPXP\^L D\^L SHUPLW\^L PXW\^L H[SOLFWD\^L WDQW\^L DQG\^L HPLWLQ\^L OLPLW\^L
RSHUDWLQDQ\^L UHTXLUHPHQW\^L IRU\^L DQG\^L DSSOLFDECH\^L HPLWLQ\^L XQLW\^L DW\^L WKH\^L IDFLQW\^L
DXWKRULWHV\^L PD\^L UHIIHJQFH\^L WKH\^L GHWDLOV\^L RI\^L WKRVH\^L OLPLW\^L DQG\^L RAKHUL\^L UHTXLUHPHQ
WKDQ\^L UHSUQLQJ\^L WKH\^L LQ\^L SHUPLW\^L SURYLGHG\^L WKDW\^L ♂ L\^L DSSOLFDELOLW\^L LWXHV\^L D

REOLJDWLRLQV\ DUH\ FODU\ L\ DQG\ L\ \& LL\ L\ WKH\ L\ SHUPLWL\ FRQWDLQV\ L\ DQ\ L\ DGGWLRLQD
FRQGLWLRLQV\ QFHWDUV\ L\ WR\ L\ DWWXUL\ FRPSOLDQFH\ L\ ZLWK\ L\ DQO\ L\ DSSOLFDEOH\ L\ UHTXLUHPHQW\ □
FDVMH\ \& L\ UHJHUHQFH\ L\ VRXOG\ L\ EH\ L\ GHWDLOHG\ L\ HQRXJK\ L\ WKDW\ WKH\ L\ PDQCHU\ L\ LQ\ L\ ZKLFK\ L\ WKH
PDWHULDOL\ DSSOLHV\ L\ WR\ L\ WKH\ L\ IDFLOLW\ L\ LVL\ FODU\ L\ DQG\ L\ LVL\ QRW\ L\ UHDVRQDEO\ L\
PLVLOH\ L\ USLUHWDWLQ\ □ L\ L\ L

,Q^L WKH^L ODWWHU^L RI^L 7HMRUR^L 5HI LQLQJ^L DOG 2UHVVH^L RQJ 3HAWL^L RQ 1R^L ;+ + !! + + + L DW
♂ ODUFK^L ¶ ↑ ☰ L + !! ↑ □ L ♂ LQWHLQDO^L FWDWL^L RPLW^L HG □ ◀ L
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\$V\^L H[SODLQHG\^L EHORZ\^L WKH\^L 'UDWL\^L 3HULW\^A V\^L LQFRUSRUDWLRQ\^L E\^L UHIIHUHQFH\^L RI\^L YDUUHTXLUHPHQW\^L IDOOV\^L VRUW\^L RI\^L WKHM\^L UHTXLUHPHQW\^L DQG\^L IDLOV\^L WR\^L FRPSRUW\^L ZLWK\^L &CHDQ\^L
↑ !! ♂ P □ ◀ ↲

¶ ¶ 7KH^L 'UDIW^L 3HUPW^L)DLOV^L WR^L ([SODLQ^L +RZ^L \$SSOLFDEOH^L 5HTXLUHFWQW^L LQ^L /LWVHG
1HZ^L 6RXUFH^L 5HYLHZ^L 3HUPW^L \$SSO\^L WR^L WKH^L +DUWLQJWRQ^L 3CDQW^L

7KH^L 'UDW^L 3HPLW^L OLWW^L PDQ^A_L DSSOLFDEOH^L UHTXLUHPHQW^L DQG^L WKH^L VSHFLI LF^L HPLW
ZKLFK^L WKH\ L DSSO\ L LQ^L WKH^L \$SSOLFDEOH^L 5HTXLUHPHQW^L 6XPPDU\ L 7DEOH\ L L 'UDW^L 3HPLW^L
'UDW^L 3HPLW^L LQFOXGHV^L DL KHDSIXOL\ ≥ODMRU^L 1HZ^L 6RXUFH^L 5HMLHZ^L 6XPPDU\ L 7DEOH\ Y^L ZKLFK
UHDGHU^L WR^L FURW\+ UHIIHUHQFH^L DQG^L ORFDWH^L WKH^L +DUULQWRQ^L SODQW\ V^L 36'\ L SHPLW^L OLPLW^L
DWDDFKHG^L WR^L WKH^L 'UDW^L 3HPLW\ ◀ L L %W\ L WKH^L LQFRUSRUDW\ G^L PLQRU^L QHZ^L VRXUFH^L UHYL
\$XWKRUL]DWLRQ^L 1RV\ L ¶ !! ← !! ⊥ ⊗\ L ¶ !! ← !! ⊥ ⊗\ L ¶ ¶ ↑ ⊗\ L ¶ ¶ → !! ⊥ ⊗\ L DQG^L
3HPLW^L QRU^L UHIIHUHQFHG^L LQ^L WKH^L 1HZ^L 6RXUFH^L 5HMLHZ^L \$XWKRUL]DWLRQ^L 5HIIHUHQFHV^L E\ L (PLV
WDEOH\ L 6H\ L 'UDW^L 3HPLW^L SS\ L → ⊕ → → ◀ L L 7KHJHIRUH\ L LW\ LV\ LPSRWLEOH^L IRU^L
XQLW^L WKHM\ L DXWKRUL]DWLRQ\ L DSSO\ L WR\ L L

7R^L DGGUHW^L WKLV^L RPLWLRQ^Q L WKH^L 'UDIW^L 3HUP^L VRXOG^L LQFOXGH^L DL WDECH^L OLW^L
EV^L DOOL RI^L WKH^L OLW^L GHZ^L VRXUFH^L UH^L HZ^L DXWKRUL]DWLRQ^Q L LQFOXGLQJ^L WKH^L PLQR^L
DXWKRUL]DWLRQ^Q L 6H^Q L 'UDIW^L 3HUP^L S^Q L → ↑ ◀ L L 7KH^L WDECH^L VRXOG^L LQFOXGH^L WKH^L D
XQW^L V^Q L WR^L ZKLFK^L LW^L DSSOLH^Q L DQG^L DQ^L UH^L HYDQW^L PRQIWRULQJ^L DQG^L UHSRUW^L QJ^L UHTXL

± □ 7KH^L 'UDIW^L 3HUP^L)DLOV^L WR^L ([SODLQ^L +RZ^L 5HTXLUHPHQW^L LQ^L 3HUP^L EV^L 5XCH^L
WR^L 8QLW^L DW^L WKH^L +DUWLQJWRQ^L 3RZHUL^L 3DQW^L

◀ 7KH^L 'UDIW^L 3HUP^L)DLOV^L WR^L ,GHQWLIA^L (PLWLRQ^L 8QLW^L \$XWKRUL]HG^L EV^L O
/LW^L GHQWLIA^L 3HUP^L EV^L 5XCH^L

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7KH^L 'UDIW^L 3HUP^L 2V^L ≥ 1HZ^L 6RXUFH^L 5HMLHZ^L \$XWKRUL]DWLRQ^L 5HIIHUHQFH^Y L WDECH^Q L
¶ T L 3/5V^L FODLPHG^L EV^L WKH^L +DUWLQJWRQ^L SODQW^Q L L +RZ^L HU^Q L RQ^L WZR^L RI^L WKH^L ¶ T L
WKH^L ≥ 1HZ^L 6RXUFH^L 5HMLHZ^L \$XWKRUL]DWLRQ^L 5HIIHUHQFH^Y L EV^L (PLWLRQ^L 8QLW^Y L 7DECH^L RQ^L S
7KXV^Q L ZLWK^L WKH^L H[FR^L WLRQ^L RI^L WKH^L WZR^L 3/5V^L OLW^L GHQWLIA^L LQ^L ERWK^L WDECH^V L ♂ 3/5L ¶ !! ↑ ◀
LW^L LV^L LPSRWLECH^L WR^L WH^L ZKLFK^L XQW^L DU^L FRYHUHG^L EV^L DOOL RI^L WKH^L UHPDLQLQJ^L
LQFOXGH^L

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x^L 3/5L 1R^Q L ¶ | ⚫ ↑ ¶ ⚫ L ↑ ¶ ⚫ L ↑ T ⚫ L → !! ⚫ L DQG^L ← ⚫ ⚫ L DQG^L GDW^L ¶ ¶ ↑ ↑ ↑
x^L 3/5L 1R^Q L ↑ ¶ L GDW^L ↑ ↑ ⚫ ↑ ¶ ⚫ L L L
x^L 3/5L 1R^Q L ← L GDW^L ⚫ ↑ → ↑ ¶ ⚫ L
x^L 3/5L ¶ !! ⚫ □ ± ⚫ ¶ DQG^L ¶ !! ⚫ □ ± ⚫ ± ⚫ ⚫ L ERWK^L GDW^L ¶ ¶ ↑ ¶ ↑ ± !! !! T
x^L 3/5L ¶ !! ⚫ □ ± ↑ ⚫ L GDW^L ¶ ¶ ↑ ¶ ↑ ± !! !! ¶ ⚫ L DQG^L
x^L 3/5L ¶ !! ⚫ □ ± → ± L GDW^L ↑ ⚫ ↑ ± !! !! L L

'UDIW^L 3HUP^L DW^L S^Q L → ↑ ◀ L L L

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1RQH^L RI^L WKHMH^L DERYH⁺ OLW^L 3/5V^L DSSHU^L DQ\ZKHUH^L LQ^L WKH^L WDECH^L EHJLQQLQJ^L R
SDJH^L → ⚫ ⚫ L HOMWCHG^L ≥ 1HZ^L 6RXUFH^L 5HMLHZ^L \$XWKRUL]DWLRQ^L 5HIIHUHQFH^Y L EV^L (PLWLRQ^L 8QLW^Y
DGHG^Q L 7KHUHIRUH^Q L LW^L LPSRWLECH^L WR^L WH^L ZKLFK^L XQW^L ⚫ L L DQ\Q L WKH^L
%HFDXVH^L WKH^L 'UDIW^L 3HUP^L IDLOV^L WR^L LGHQWLIA^L WKH^L HPLWLRQ^L XQW^L DXWKRUL]HG^L EV^L
UHTXLUHPHQW^L RI^L WKHMH^L UXCH^Q L LW^L LPSRWLECH^L WR^L WH^L KRZ^L WKH^L 3/5V^L DSSO\ L WR^L
+DUWLQJWRQ^L SRZHUL^L SODQW^Q L WKH^L XQGHUPLQLQJ^L WKH^L HQIRUFHDELOLW^L REMHBRQHWRUHPHQW^Q
7LW^L 9L 3HUP^L 1R^Q L 2L ¶ ⚫ ⚫ ⚫ L &KHYURQ^L 3KLOOLSV^L &KHLPLFDOL^L &REXIDOW^L 4 3KLOOLSV^L !!! SADQ
DW^L à L → L ⚫ 'UDIW^L 3HUP^L IDLOHG^L WR^L PHW^L + !! L &)◀ 5◀ L Ü^L → !! ◀ ⚫ ⚫ D^L ⚫ ⚫ D^L
XQW^L DXWKRUL]HG^L XQGHU^L VSHFLILHG^L 3/5V^Q L □ L L L L

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\$GGWLRQDOO\ ⚫ 3/5L ¶ !! ⚫ □ ± ⚫ ¶ DQG^L ¶ !! ⚫ □ ± ⚫ ± L PD\ L QRW^L EH^L LQFOXGHG^L DW^L
2Q^L WKH^L IDFH^Q L WKHMH^L WZR^L UXCH^L YLRODW^L RQH^L RI^L (3\$2V^L PRW^L EDVLFL^L UHTXLUHPHQW^L
3HUP^L EV^L 5XCH^Q L EHFDXVH^L WKHMH^L 3/5V^L DU^L QRW^L WDLOUHG^L WR^L DQ\ L VSHFLILHG^L WSH^L RI
UHSHDW^L IRXQG^L WKDW^L WR^L EH^L SUDFWLFDEO\ L HQIRUFHDECH^Q L PLQR^L VRXUFH^L SHUPLW^L PXW^L
FOHDUO\ L GHILOQHG^L FDWHRUJ^L RI^L VRXUFH^L WKDW^L LV^L CDURZ^L HQRXJK^L WR^L DOORZ^L VSHFLILHG^L OL

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L J L T L

x^L 3/5^L 1RV^L ↗ ♩ + ♩ ↗ ↑ ♩ ♩ ↗ ↑ ♩ ↗ → !! ♩ ↗ DQG^L ← + ♩ ↗ DQG^L GDWKG^L ♩ ♩ ↑ ↑ ↑
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x^L 3/5^L 1R^L ↗ ← L GDWKG^L ↑ ↓ → ↑ ♩ + + L
x^L 3/5^L ♩ !! ↗ ◀ + ↗ ♩ ↗ DQG^L ♩ !! ↗ ◀ + + ♩ ↗ ERWK^L GDWKG^L ♩ ♩ ↑ ♩ ↑ !! + !! T L
x^L 3/5^L ♩ !! ↗ ◀ + + ↗ GDWKG^L ♩ ♩ ↑ ♩ ↑ + !! !! ♩ ↗ DQG^L L
x^L 3/5^L ♩ !! ↗ ◀ + ↗ + GDWKG^L ↑ + + + !! !! L L

E◀ :KLFK◀ 3R00XWDQW◀ OD\◀ WKH◀ +DWLQJWRQ◀ 3ODQW◀ (PLW◀ IURP◀ (DFK◀ 8QLW◀ 8QG
8QDLPHG◀ 3HUPLWV◀ E\◀ 5XOH"◀ L◀ L◀

L
3/5V^L PDI^L EH^L XMHG^L WR^L DXWKRUL]H^L H[QWFRQDPRODW^L RAKHUL^L WKDQL^L ZDWHU^L L QWURJHQ^L
HWKDHQ^L KIGURJHQ^L R[\JHQ^L DOGL^L JUHHOKRXMH^L JDWMH^L T^L 7H[^L \$CPLQ^L &RGH^L
+RZHMHU^L FODLPLQJ^L DL^L 3/5^L IRU^L DL^L SURMHFW^L FDQQRW^L DXWPDWLFDO\^L DXW^L WKH^L
SROOXWDQW^L XS^L WR^L WKH^L OLPLW^L LGHQW^L H^L ILQ^L 7B4^L 124^L 73<^L 82^L ,^L 73<^L 92^L
,^L 73<^L 62^L 73<^L 30^L ,^L 73<^L 16DQ^L 162B^L 73^L ,^L WKDW^L ZHUH^L WKH^L
FDMH^L DFK^L FODLPHG^L 3/5^L ZRXOG^L DXWKRUL]H^L DOORZDECH^L HPLWLRQ^L LQFHDMHV^L H[FHGLQJ^L DSSOL^L
VRXUFH^L DQG^L PDMRU^L PRGLI^L LFDWLRLQ^L WKUHMKROGV^L ,^L LQ^L PRQW^L UIRF^L HDXWKRUL]H^L WDQ^L RUL^L SXEOLF^L
SDWFLFSDWLRLQ^L ZRXOG^L FRPSCHWHO^L XQGHUPLQH^L WKH^L LQWHJULW^L RI^L 7H[DVA^L PDMRU^L
DL^L UHDGLQJ^L ZRXOG^L DOVR^L LPSURSHUO^L DOORZ^L +DUWLQJWRQ^L WR^L HPLW^L 165^L SROOXWDQW^L DW^L CHY^L
VLJQLI^L LFDQW^L GHWHULRUDWHL^L H[LWALQJ^L DLU^L TXDOLW^L DQG^L FDXVH^L YLFDWLRLQ^L RI^L KHDDWK^L
TXDOLW^L WDQGDUGV^L ZLWKR^L SULRU^L DSSURYDO^L E\^L WKH^L 7&(4^L 8^L 6^L &^L Ü^L →^L
FRQWDLQ^L SURYLVRQV^L WR^L SURKLELW^L FRQWULXPWLRLQ^L RI^L VRXUFH^L WKDW^L ZLOOL^L FDXVH^L RUL^L FRQW^L
RI^L DPELHQW^L DLU^L TXDOLW^L WDQGDUGV^L RUL^L 36'^L UHTXLUHPHQW^L ◀^L

)RUWQDWHQ\ 7H[DVL GRHV L QRM VHP L WR L UHDGL LWW L UXCHV L WR L UHDFK L WKLV L FRQFOX
RQ\ L HPLWLRQV L UHDWHL WR L WKH L SDUWLFXODU L FRQWUXFWLRQ L SURMHFW L IRU L ZKLFK L D L 3
DXWKRUL]HG\ L H\ 7H[\ \$GPLQ\ L &RGH L Ü L ¶ !! + - + \ D\ L \ WDWLQJ L WKDW L HPLW
DXWKRUL]HG\ L E\ L 3/5 L PXW L UHDLQL EHORZ L WKDW L ¶ !! + - + \ D\ L \ OSSOLFRQWLRQ L OLPP
\ HPSKDV LV L DGGHG\ L DQG \ \ L FXPXODWLYH L DXWKRUL]HG\ L HPLWLRQV L IRU L HDFK L 3/5 L SU
EHORZ L WKH L PDVRU L PRGL I LFDWLRQ L W\ KHM\ SREBOLW\ L GHFLRQ\ L ¶

+RZHMHJU~~J~~ L WKH~~L~~ 'UDW~~L~~ 3HUPIWL XQGHUPLQHV~~L~~ WKH~~L~~ HQIRUFHDELOLW~~L~~ RI~~L~~ WKHM~~L~~ UHWAULFWL
GRHV~~L~~ QRW~~L~~ FRQNDLQL~~D~~ DQ\~~L~~ LQIRUPDWLRQ~~L~~ GHMULELQJ~~L~~ WKH~~L~~ SURMHFW~~L~~ DQG~~L~~ HPLWLRQV~~L~~ DXWKRLU~~J~~ H
HPLWLRQ~~L~~ XQLW~~L~~ DW~~L~~ WKH~~L~~ +DULQJWRQ~~L~~ 3RZHJ~~L~~ 3DQW~~M~~ L L ,QWHGDQ~~J~~ L WKH~~L~~ 'UDW~~L~~ 3HUPIWL RQW~~L~~
UXCH~~L~~ QXPEHU~~L~~ DQG~~L~~ D~~V~~ L H[SODLQHG~~L~~ DERYH~~M~~ L IDLOV~~L~~ WR~~L~~ LGHQWL~~M~~ L WKH~~L~~ HPLWLRQ~~L~~ XQLW~~L~~ V~~X~~
FODLPHG~~L~~ 3/5V~~M~~ L L 7KLV~~L~~ PHWKRG~~L~~ RI~~L~~ OLW~~L~~ QJ~~L~~ 3/5~~L~~ UHTXLUH~~L~~ PHQW~~L~~ LQ~~L~~ WKH~~L~~ 'UDW~~L~~ 3HUPIWL L
WKDW~~L~~ HDFK~~L~~ XQLW~~L~~ DXWKRLU~~J~~ HG~~L~~ E~~V~~ L D~~L~~ 3/5~~L~~ PD\~~L~~ HPLW~~L~~ DOO~~L~~ FRQNDPLQDQW~~L~~ OLW~~L~~ HG~~L~~ LQ~~L~~ ¶ !! F
FRQNDLQHG~~L~~ LQ~~L~~ WKDW~~L~~ ≥ JHQHUDO¥ L UXCH~~J~~ L XQCHW~~L~~ WKH~~L~~ VSHFLI~~L~~ FODLPHG~~L~~ 3/5~~L~~ FRQNDLQV~~L~~ P
%HDXVH~~L~~ WKH~~L~~ LQFRUSUDW~~H~~ UXCHV~~L~~ GR~~L~~ QRW~~L~~ LGHQWL~~M~~ L ZKLFK~~L~~ RI~~L~~ WKH~~L~~ PDQ\~~L~~ GLI~~L~~ HUHQW~~L~~ SRO
PD\~~V~~ EH~~L~~ XMHG~~L~~ WR~~L~~ DXWKRLU~~J~~ H~~L~~ DW~~L~~ WKH~~L~~ +DULQJWRQDFR~~R~~ BODX~~R~~ HGV~~L~~ WR~~L~~ HPLW~~J~~ L WKH~~L~~ 'UDW~~L~~
3HUPIWL PXW~~L~~ SURYLGH~~L~~ WKLV~~L~~ LQIRUPDWLRQ~~M~~ L L 7KH~~L~~ 'UDW~~L~~ KRUH~~L~~ PXW~~L~~ SURYLGH~~L~~ 3/5V~~L~~
DSSOL~~L~~ WR~~L~~ HPLWLRQ~~L~~ XQLW~~L~~ DW~~L~~ WKH~~L~~ 3DQW~~M~~ L L %HDXVH~~L~~ WKH~~L~~ 'UDW~~L~~ 3HUPIWL RPLW~~L~~ W
LQFRPSOH~~H~~ DQG~~L~~ IDLOV~~L~~ WR~~L~~ DWXUH~~L~~ FRPSOLDQFH~~L~~ ZLWK~~L~~ DSSOLFDEOH~~L~~ UHTXLUH~~L~~ PHQW~~M~~ L L L

¶ 7KH^L WHUPL ≥ FRQNDPLQDQW^X ¥^L DV^L GHILQHG^L EV^L WKH^L 7H[DVL &CHDQL \$LU^L \$FW^L HQFRPSDW-H
UHJXODWGL 165^L SROOXW^W 7H[^L +HDQNL^L 6DIHWL &RGH^L Ü^L T^L ←^L ↙^L !^L !^L T^L ♂^L ↘^L □^L
¶ \$YDLODECH^L HOHWURQLFDQO^L DW^L

KWASV I ZZZ WHTI WH DVA JRY DWHWI SXEOLF! SHPLW!LQJ! DLU! DRUPV! 3HPLW%5XCH! &

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, I L WKH^L ([HFXALYH^L 'LUHFWRU^L FRQWHQGV^L WKDW^L WKH^L 'UDW^L 3HPLW^L SURYLGHV^L LQIRUPDWLRQ^L VFRQWPLQDQW^L HDFK^L HPLWLRQ^L XQW^L DXWKRUL]HGL E\ L 3/5^L DW^L WKH^L +DUWLQJWRQ^L 3ZHUL^L 3DQW^L &RPPHQWUV^L DVN^L WKDW^L KHL LOGLFDWH^L ZKHJH^L LQ^L WKH^L 'UDW^L 3HPLW^L 6ADWPHQW^L RI^L %DWL^L LQFRUSRUDW^{HG}^L 3/5V^L WKLV^L LQIRUPDWLRQ^L PDA^L EH^L IRXQG^L

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F◀ +RZ^L 0XFKL^L 3ROOXLRLQ^L OD\ L +DUWLQJWRQ^L (PLW^L 8QGHU^L &ODLPHG^L 3HPLW^L E\ L 5XCH^{"L} L

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&DMH^L E\+ FDMH^L SHUPLW^L LQFRUSRUDW^{HG}^L LQWR^L WKH^L 'UDW^L 3HPLW^L DUH^L HDFK^L DWLJQH^L QXPEHU^L DQG^L JHQHDOO\ L QFOXGH^L VRXUFH^L VSHFLILF^L HPLWLRQ^L OLPLW^L DQG^L VSHFLDOL^L FRQGLW^L ([HFXALYH^L 'LUHFWRU\ L UHJLHZ^L RI^L WKH^L RSHUDWRU\ L DSSOLFDWLRQ^L L L %W^L 3/5V^L HWDEC^L OLPLW^L DQG^L RSHUDWLQJ^L UHTXLUHPHQW^L WKDW^L DSSO\ L WR^L DOO^L QHZ^L DQG^L PRGLILHG^L IDFLQLW^L XQOHW^L WKH^L RSHUDWRU^L UHJLWHUV^L 3/5^L HPLWLRQW^L 0XCH^L UHJLWHUV^L 7KHM^L J^L UHTXLUHPHQW^L DUH^L IRXQG^L LQ^L 7H[DV\ L 3/5^L UXCH^L L L :KHL FRQWUXFWLRQ^L RI^L DL QHZ^L RU^L XQW^L LV^L DXWKRUL]HGL E\ L 3/5^L WKH^L 3/5^L RUL^L 3/5V^L FODLPHG^L E\ L 7KHM^L J^L SHUPLW^L DXWKRUL]LQJ^L WKH^L 6ADWPHQW^L Ü^L ¶!! ↑ ← ↑ ¶!! ≥) @DFLQLW^L RUL^L SKVLF^L FKDQJHV^L WR^L DL IDFLQLW^L DUH^L SHUPLW^{HG}^L E\ L UXCH^L SURYLGHG^L WKDW^L DOO^L RI^L WKH^L IROORZ^L VHFWRQ^L DUH^L VDWLVI LGH¥^L □◀ L L L

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7KX^L L ZKLOH^L WKH^L 'UDW^L 3HPLW^L LGQWLT LHV^L LQFRUSRUDW^{HG}^L FDMH^L E\+ FDMH^L SHUPLW^L XQLTXH^L SHUPLW^L QXPEHUV^L DQG^L WKH^L GDWHV^L RQ^L ZKLFK^L WKH^L ZHUH^L LWXHG^L L WKH^L 'UDW^L DSSOLFDEOH^L WKH^L 3/5^L QXPEHU^L DQG^L WKH^L GDWHV^L WKDW^L HDFK^L UXCH^L ZDV^L SURPXQJDW^{HG}^L ± L QF^L LW^L ZDV^L FODLPHG^L E\ L +DUWLQJWRQ^L L L 'UDW^L 3HPLW^L DW^L → ↑ ◀ L L 7KLV^L ZDV^L RI^L OLWLQJ^L PLVHDGLQJ^L EHFDXW^L LW^L VXJHWW^L WKDW^L HDFK^L FODLPHG^L 3/5^L OLNH^L WKH^L FDMH^L E\+ FDMH^L WKH^L 'UDW^L 3HPLW^L L L D L VLQJH^L SHUPLW^L L L 7R^L GHWHUPLQH^L KRZ^L PXFK^L SROOXLRLQ^L DQI^L XQW^L RUL^L DOO^L HPLWLRQ^L XQW^L FRYHUG^L E\ L 3/5^L PD\ L HPLW^L RQ^L FDQQRW^L VLPSO^L OR^L LQIRUPDWLRQ^L LQ^L WKH^L 'UDW^L 3HPLW^L L L 2CH^L PXW^L KDH^L DGGWLRQDOL^L LQIRUPDWLRQ^L WR^L NQR^L DSSOLHM^L WR^L ZKLFK^L XQW^L WKH^L DSSO\ L DQG^L KRZ^L FRPSOLDQFH^L L L WR^L EH^L GHWHUPLQH^G 3HPLW^L SURYLGHV^L WKLV^L LQIRUPDWLRQ^L LW^L L L LPSRWLECH^L WR^L WHOL^L KRZ^L PXFK^L HDFK^L 3/5^L XQW^L LV^L DXWKRUL]HGL WR^L HPLW^L L L L

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&◀ 7KHL 'UDW^L 3HPLW^L)DLOV^L 7R^L \$WXLH^L &RPSOLDQFH^L :LW^L &HJWDLQ^L \$SSOLF

5HTXLUHPHQW^L

7WCH^L 9 L SHUPLW^L PXW^L VSHFLI\ L PRQLWRULQJ^L PHWKG^L WKDW^L DWWUH^L FRPSOLDQFH^L DSSOLFDEOH^L UHTXLUHPHQW^L L L + L 8◀ 6◀ &◀ Ü^L → ↑ ¶!! F♂ D□ L DQG^L F□ L + !! L &◀) → !! L → F♂ D□ L DQG^L F□ L + !! L 7WCH^L 9 L SHUPLW^L PXW^L LQFOXGH^L WHWLQJ^L PRQLWRULQJ^L UHSRUWLQJ^L DQG^L UHFRUGHSLQJ^L UHTXLUHPHQW^L VXII LFLHQW^L WR^L ZLWK^L WKH^L WHUPV^L DQG^L FRQGLWLRQ^L RI^L WKH^L SHUPLW^L ¥ L 6LHJUD^L &OXE^L 5Y^L U\$^L ¶◀ F♂

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)◀ T GL → T L ♂ '◀ &◀ L &LU◀ L ± !! ← □◀ L L 7R L FRPSO\ L ZIWK L WKLV L PDQGDWQ ◀ L SHUPLW
WHSV L L L

♂ 93HUPIWLQJ L DXAKRULWLHV L PXW L HQXUH L WKDW L PRQLWRULQJ L UHTXLUHPHQW L FRQNDLQH L
DSSOLFDECH L UHTXLUHPHQW L DUH L SURSHUO\ L LQFRUSRUDWHL LQWR L WKH L 7LWHL 9 L SHUPLW
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♂ ±, D L WKH L DSSOLFDECH L UHTXLUHPHQW L FRQNDLQ L QR L SHURGLF L PRQLWRULQJ ◀ L SHUPLW
DXAKRULWLHV L PXW L DGG L SHURGLF L PRQLWRULQJ L VXT L LFLHQW L WR L \LHOG L UHOLDECH L GD
WKH L UHODQW L WLPH L SHURGL W KDW L DUH L UHSUHMQWDLYH L RI L WKH L VRXUFH \AV L FRPSO
WKH L SHUPLW L L

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♂ +, D L WKHUH L LV L VRPH L SHURGLF L PRQLWRULQJ L LQ L WKH L DSSOLFDECH L UHTXLUHPHQW L
PRQLWRULQJ L LV L QRW L VXT L LFLHQW L WR L DAXUH L FRPSOLDQFH L ZIWK L WKH L SHUPLW WHUPW
FRQGLWLRQ ◀ L SHUPLW LQJ L DXAKRULWLHV L PXW L VXSSCPHQW L PRQLWRULQJ L WR L DAXUH L
FRPSOLDQFH L DQG L

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♂ 43HUPIWLQJ L DJHQFLHV L PXW L FODUO\ L GRFXPHQW L WKH L UDMLRQDHL IRU L WKH L PRQLW
UHTXLUHPHQW L WKH L UHDFW L LQ L WKH L SHUPLW UHFRUG L L L L

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, Q L WKH L ODMRU L RI L 8QWHLG L 6ADWHL GWHOL &RUS ◀ *UZQDU\ L SODA\ L 3HUPIWLQ L 1R ◀ L 9+ ± !!
♂ -DQXDU\ L T ♀ ♀ L ± !! ♀ ♀ □ L ♂ ≥ *UDQWTHBLWBDUN L 2UDQWYDQFLW L DW L L 4 L ← L

7KH L 'UDM L 3HUPIWL L V L GHILFLHQW L DV L H[SDOLQH L EHORZ ◀ L EHFDXVH L IW L GRHV L QRW
ZIWK L DSSOLFDECH L UHTXLUHPHQW ◀ L IW L IDLOV L WR L SURSHUO\ L LQFRUSRUDWHL PRQLWRULQJ L UHTXL
HWDEOLVK L SHURGLF L PRQLWRULQJ L UHTXLUHPHQW L IRU L DSSOLFDECH L UHTXLUHPHQW L WKDW L
PRQLWRULQJ ◀ L IW L IDLOV L WR L VXSSCPHQW L LQXIT L LFLHQW L PRQLWRULQJ L UHTXLUHPHQW L LQ L DSSOL
DQG L WKH L SHUPLW UHFRUG L IDLOV L WR L SURYLGH L D L FODU L UDMLRQDHL IRU L WKH L PRQLWRULQJ L W

♀ 47KH L 'UDM L 3HUPIWL)DLOV L WR L \$WUH L &RPSOLDQFH L ZIWK L ODMRU L 1HZ L 6RXUFH L 5HYL
(PLWLRQ L /LPLWW L

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7KH L 'UDM L 3HUPIWL V L ODMRU L 165 L 6XPPDU\ L 7DEOHV L ♂ 'UDM L 3HUPIWL SS ◀ L ← ♀
PRQLWRULQJ L DQG L WHWLQJ L UHTXLUHPHQW L ZKLFK L DUH L VXSSCPHQW L WR L DAXUH L RQJRLQJ L FRPSOLD
PDMRU L 165 L HPLWLRQ L OLPLWW L FRQNDLQH L LQ L WKH L OD[LPXP L \$OORZDEOH L (PLWLRQ L 5DWH L 7DEO
+DULQWRQ L SODQW V L WR L 36' L SHUPLW ◀ L L &RPPPHQWUV L DSSUHFLDWHL WKDW L 7&(4 L KDV L LQF
165 L 6XPPDU\ ¥ L WDEOHV L LQ L WKH L 'UDM L 3HUPIWL L L 7KHM L WDEOHV L DUH L D L WHS L LQ L WKH L
WKH L PDMH L 7LWHL 9 L SHUPLW L PRUH L WUDQVSDUHQW L DQG L XQGHUWLDQDEOH ◀ L L +RZHMHU ◀ L WKH L
DQG L WHWLQJ L UHTXLUHPHQW L GR L QRW L GHPRQWUDWHL FRPSOLDQFH L HSHFLDO\ L IRU L HPLWLRQ L
EH L PHW L RQXDO EDVLV ◀ L

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)RU^L H[DPSCH^Q L 8QLW[¶] L LV^L SURKLEIWHGL TURPL HPLWLQJ^L PRUH^L WKDQ^L ¶ ☺ ↑ + + L OEV[↓] KUL RI^L 30 DQG^L ¶ ↑ + + L OEV[↓] KUL RI^L 92&+ L L 7KH^L PRQLWRULQJ^L DQG^L WHWLQJ^L U VSSRMHG^L WR^L DMAXUH^L FRPSOLDQFH^L ZLWK^L WKH^L KRXUO\ L OLPLW^L DUH^L DV^L IROORZV^L

 L

x^L 7RL VKRZ^L FRPSOLDQFH^L ZLWK^L WKH^L &2^L OLPLW[¶] L WKH^L 'UDM^L 3HPLW^L UHOLH^L
 XQGHUO\ LQJ^L 36' L SHUPLW^L 6SHFLDO^L &RQGLWRQ^L + L ☀ OLPLWLQJ^L WKH^L KHDW^L LQSXW^L
 PRUH^L WKDQ^L T ☺ ↑ + !! L 00%WK[↓] KRXUO\ L DQG^L ☀ E^L L WKH^L XQGHUO\ LQJ^L 36'
 &RQGLWRQ^L ¶ + L ☀ UHTXLULQJ^L DQ^L DQQXDO^L VADFN^L WHWL^L IRU^L DL ILYH^L \HDL^L SHU^L
 + !! ¶ !! + ☀ L L 7KHMH^L WZR^L SHUPLW^L FRQGLWRQV^L GR^L QRW^L DMAXUH^L FRPSOLDQFH^L Z
 ZKLFK^L PXW^L EH^L PHW^L RQ^L DQ^L RQJRLQJ^L EDMLV[¶] L

x^L 7RL VKRZ^L FRPSOLDQFH^L ZLWK^L WKH^L KRXUO\ L OLPLW[¶] L WKH^L 'UDM^L 3HPLW^L UHOLH^L RQ^L
 XQGHUO\ LQJ^L 36' L SHUPLW^L 6SHFLDO^L &RQGLWRQ^L + L ☀ OLPLWLQJ^L WKH^L KHDW^L LQSXW^L
 PRUH^L WKDQ^L T ☺ ↑ + !! L 00%WK[↓] KU^L DQG^L ☀ E^L L WKH^L XQGHUO\ LQJ^L 36'
 &RQGLWRQ^L → L ☀ UHODWLQJ^L WRL FRPSOLDQFH^L ZLWK^L IHGHUDOL^L 1HZ^L 6RXUFH^L 3
 6ADQGDUGV^L DQG^L 1DWLRQDO^L (PLWLQ^L 6ADQGDUGV^L IRU^L +D]DUGRAV^L \$LU^L 3RQXWDQW^L
 WZR^L SHUPLW^L FRQGLWRQV^L GR^L QRW^L DMAXUH^L FRPSOLDQFH^L ZLWK^L WKH^L KRXUO\ L OLPLW^L
 EH^L PHW^L RQ^L DQ^L RQJRLQJ^L EDMLV[¶] L

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x^L 7RL VKRZ^L FRPSOLDQFH^L ZLWK^L WKH^L KRXUO\ L 92&+ L OLPLW[¶] L WKH^L 'UDM^L 3HPLW^L U
 XQGHUO\ LQJ^L 36' L SHUPLW^L 6SHFLDO^L &RQGLWRQ^L + L ☀ OLPLWLQJ^L WKH^L KHDW^L LQSXW^L
 PRUH^L WKDQ^L T ☺ ↑ + !! L 00%WK[↓] KU^L 7KL^L SHUPLW^L FRQGLWRQ^L GRH^L QRW^L D
 ZLWK^L WKH^L KRXUO\ L OLPLW[¶] L ZKLFK^L PXW^L EH^L PHW^L RQ^L DQ^L RQJRLQJ^L EDMLV[¶] L

L

8QLW^L + L DQG^L T ☺ + L VPLODUO\ + L ODFN^L WKH^L PRQLWRULQJ^L VXTI LFLHQW^L WR^L DMAXUH^L FR
 HPLWLQ^L OLPLW^L IRU^L &2^L 30[¶] L DQG^L 92&+ L IRXQG^L LQ^L WKH^L 36' L SHUPLW[¶] V ≥ 0\$(57[¶] ¥
 L

x^L 7RL VKRZ^L FRPSOLDQFH^L ZLWK^L WKH^L KRXUO\ L &2^L OLPLW[¶] L WKH^L 'UDM^L 3HPLW^L UHOLH^L
 XQGHUO\ LQJ^L 36' L SHUPLW^L 6SHFLDO^L &RQGLWRQ^L + L ☀ OLPLWLQJ^L WKH^L KHDW^L LQSXW^L
 + L DQG^L %RLOHU^L 8QLW^L T L WR^L QR^L PRUH^L WKDQ^L T ☺ ← + !! L DQG^L T ☺ ← + !! L 00%
 7KH^L KRXUO\ L KHDW^L LQSXW^L UDWH^L GRH^L QRW^L DMAXUH^L FRPSOLDQFH^L ZLWK^L WKH^L KRXUO\ L
)RU^L %RLOHU^L 8QLW^L + ☀ L WKH^L XQGHUO\ LQJ^L 36' L SHUPLW^L 6SHFLDO^L &RQGLWRQ^L ← L
 DL PRQLWRULQJ^L DQG^L WHWLQJ^L UHTXLULPHQW^L L EXW^L WKDQ^L FRQGLWRQ^L UHTXLULHV^L DQ^L
 L

x^L &RPSOLDQFH^L ZLWK^L WKH^L KRXUO\ L 30 DQG^L LV^L GHPHQWUDWHL^L WKURXJK^L WKH^L
 XQGHUO\ LQJ^L 36' L SHUPLW[¶] V 6SHFLDO^L &RQGLWRQ^L + ☀ L → ☀ L DQG^L ¶ + + L &
 KHDW^L LQSXW[¶] L DQG^L 7&(4 L KDV^L QRW^L H[SODLQHG^L KRZ^L WKLV^L OLPLW^L DMAXUH^L FRPS^L
 KRXUO\ L 30 L OLPLW[¶] L L &RQGLWRQ^L → L UHTXLULHV^L FRPSOLDQFH^L ZLWK^L FHJWDLQ^L IH^L
 EXW^L VD\V^L QRWKLQJ^L DERXW^L FRPSOLDQFH^L ZLWK^L WKH^L KRXUO\ L OLPLW^L FRQWDLQHG^L LQ^L
 &RQGLWRQ^L ¶ + L L VLV^L VLPSO\ L D L YDJXH^L DQG^L JHQHUDO^L SURYLVLRQ^L WKDQ^L UHTXLULHV^L

≥PLQLPL]H^L HPLWLRQV¥^L GXULQJ^L SODQQHG^L 066^L DFALYIWLHM^L L^L 7KHM^L WK
SURYLVLRQV^L GR^L QR^L DWXUH^L FRPSOLDQFH^L ZLWK^L WK^L 36'^L SHUPLW^V KRXUO^V
PDW^H OLPLWW[◀] L^L

x^L 7R^L VKRZ^L FRPSOLDQFH^L ZLWK^L WK^L KRXUO^V 92&^L OLPLWW^L IRU^L %RLOHU^L 8QLVV^L L^L
3HUP^L OLWW^L RQ^L &RQGLWRQ^L +^L ±^L WK^L KRXUO^V KHDW^L LQSXW^L OLPLWW[◀] L^L
LQSXW^L OLPLWW^L GR^L QR^L DWXUH^L FRPSOLDQFH^L ZLWK^L WK^L KRXUO^V 92&^L OLPLWW[◀] L^L

7R^L WK^L HMHQW^L WKDW^L WK^L 'UDW^L 3HUP^L UHDLHV^L RQ^L WK^L SURYLVLRQV^L LQ^L WK^L +DU
36'^L SHUPLWW^L WR^L DWXUH^L FRPSOLDQFH^L ZLWK^L WK^L PDW^L QHZ^L VRXUFH^L UHMLHZ^L HPLWLRQ^L OLPLWW[◀]
IDLOV^L WR^L PHW^L 7LW^L 9^L UHTXLUH^V)RU^L +DUULQJWRQ^L 8QLVV^L L^L DOG^L T[♂] L^L 3HUP^L
6SHFLDO^L &RQGLWRQ^L +^L VWDWHV^L L^L

≥7KH^L UHFRUGV^L UHTXLUHG^L LQ^L 6SHFLDO^L &RQGLWRQ^L 1RV[◀] L^L DOG^L L^L VKDOL^L FRQWW^L
GHPRQWUDW^L FRPSOLDQFH^L ZLWK^L WK^L OLPLWW^L VSHFLILHG^L LQ^L WKLV^L SHUPLWW[◀] ¥^L

+RZHMU[♂] L^L 6SHFLDO^L &RQGLWRQ^L 1R[◀] L^L UHTXLUHV^L QRWKLQJ^L PRUH^L WKDQ^L D^L RQH[†] WPH^L WDF^L
PRQR[LG[♂] L^L D^L WHM^L WKDW^L KDV^L SUHXPDEO^V KDSHQHG^L VRPH^L \HDUV^L DJRL^L &WK^L WHM^L
+DUULQJWRQ^L FRPSCHWHV^L D^L SURMHW^L DSSURYHG^L LQ^L !!^L ← □^L L^L 6SHFLDO^L &RQGLWRQ^L 1R[◀] L^L
RI^L VWDFN^L WHM^L EH^L NSW[◀] L^L %W^L WKHUH^L LV^L QR^L RAKHU^L PHQNLRQ^L LQ^L WK^L SHUPLWW^L RI^L D^L
UHTXLUH^V)RU^L L^L L^L

7KX[♂] L^L QHLWKHU^L WK^L 'UDW^L 3HUP^L QR^L WK^L LQFRUSRUDWHG^L 36'^L SHUPLWW^L DWXUH^L FR
WK^L PD[LPXP^L KRXUO^V L^L HPLWLRQ^L OLPLWW^L FRQNDQHG^L LQ^L WK^L +DUULQJWRQ^L SODQW^V 36'^L SHUPLWW^L

± 7KH^L 'UDW^L 3HUP^L)DLOV^L WR^L \$WXUH^L &RPSOLDQFH^L ZLWK^L ODMRU^L 1HZ^L 6RXUFH^L 5HYL^L
(PLWLRQ^L /LPLWW^L 'XULQJ^L 30QQHG^L ODLQWHDQFH[♂] L^L 6DUW[♂] L^L DOG^L 6KXWGRZQ^L \$FALY^L

%R^L RI^L WK^L +DUULQJWRQ^L SODQW^V 36'^L SHUPLWW^L VWDWH^L WKDW^L L^L

≥7KH^L OEV[†] KRXU^L DOG^L WS^V L^L HPLWLRQ^L OLPLWW^L VSHFLILHG^L LQ^L WK^L 0\$(57^L IRU^L WK^L
HPLWLRQV^L TURP^L WK^L IDFLQW^L GXULQJ^L ERW^L QRUPDO^L DOG^L SODQQHG^L 066^L DFALYIWLHM^L
'UDW^L 3HUP^L DW^L S[◀] L^L DOG^L +^L □^L L^L

%W^L WK^L 'UDW^L 3HUP^L GR^L QR^L DWXUH^L FRPSOLDQFH^L ZLWK^L WK^L KRXUO^V L^L HPLWLRQ^L
SHULRGV^L RI^L SODQQHG^L 066[♂] L^L EHFDXVH^L WK^L +DUULQJWRQ^L SODQW^L KDV^L FRQGXWHG^L QR^L PRQIWRU^L
RJ^L 92&^L HPLWLRQV^L GXULQJ^L SHULRGV^L RI^L SODQQHG^L 066[◀] L^L 7KH^L +DUULQJWRQ^L SODQW^L KDV^L FR
WHM^L WR^L GHWHPLQH^L HPLWLRQV^L RI^L &2[♂] L^L 30[♂] L^L RUL^L 92&^L GXULQJ^L SHULRGV^L RI^L SODQQHG^L PD
DOGL^L VXXWGRZQ[◀] L^L, I^L &RPPHQW^L DUH^L ZURQJ^L DERW^L WKLV^L DWIJWLQ[♂] L^L WKHQ^L ZH^L UHTXHWW^L
'LUHFWRU^L PDNH^L WK^L VWDFN^L WHM^L LQIRUPDWLRQ^L DYDLODECH[♂] L^L DOG^L DOVR^L XSGDW^L WK^L 'U

LQFOXGLQJ L WKH L 6\WPHPHQW RI L %DVLV\ L WR L H[SODLQL KRZ L SULRU L WDFN L WHWW L DQG L DQ L R
FRPSOLDQFH L ZLWK L WKH M L KRXUO \ L HPLWLRQ L OLPLW L GXULQJ L SHURGV L RI L SODQQHG L 066 L
L

7KH L ([HFXALYH L 'LUHFWRU L VRXOG L DOVR L H[SODLQL KRZ L WKH L PRQLWRULQJ L DQG L WHWWLQJ L
LQ L WKH L 'UDIW L 3HPLW L DAXUH L RQJRLQJ L FRPSOLDQFH L ZLWK L WKH L +DUULQWRQ L SODQW V L 36' L
KRXUO \ DOORZDEOH L HPLWLRQ L UDWHV L IRU L &2\ L 30\ L DQG L 92& L GXULQJ L SHURGV L RI L SODQQH
WWDWKS L DQG L VKXWGRZQ L
L

3HPLW L 1R L ↑ ¶ ± ↑ 36'7; || ¶ → ± 0± \ L 6SHFLDO L &RQGLWRQV L ¶ | + L DQG L ¶ → L ♂
DQG L 3HPLW L 1R L ¶ | T ← ← ↑ 36'7; | T ¶ 0¶ \ L 6SHFLDO L &RQGLWRQV L ± T L DQG L ± + L ♂ FRY
FRPSOLDQFH L ZLWK L KRXUO \ L HPLWLRQ L OLPLW L 7KRMH L SHULW SURYLVLRQ V UHTXLUH L WKH L +
DQXDOO \ L FRQI LUP L WKH L ≥ FRQNLQXHG L YDOLGLW L RI L WKH L HWLPDWHG L SRWHDOL WRL HPLW V
066 L DFALYWLHV L &RQI LUPLQJ L WKDW L WKH L HWLPDWV L PDGH L LQ L LVW L SHULW DSSOLFDWLRQ L
LV L D L YDJXH L DQG L PHDQLQJCHV L SURYLVLRQ V WKDW L LQ L QR L ZD \ L PHWV L WKH L UHTXLUHPHQW V WKD
DAXUH L RQJRLQJ L FRPSOLDQFH L ZLWK L DSSOLFDEOH L UHTXLUHPHQW V L L)RUL RAKHUL SODQQHG L
6SHFLDO L &RQGLWRQV L ¶ → ▲ % L ♂ LQ L 8QLWV L ± L DQG L T L 36' L SHULW L DQG L ± + ▲ % L ♂ LQ L
+DUULQWRQ L SODQW L XQIHWVHUGL ODWLVHGL WRL GHWUPLQH L HPLWLRQV L ≥ XVLQJ L DQ L DSSU
LQFOXGLQJ L EXW L QRW L OLPLW L WRL L WKH L PHWKRGV L GHMULEHG ' ¥ L L 7KLVL RSHQ L HQHG L SURYL
DAXUDQFH L RI L FRPSOLDQFH L L L ,QGHG L &RPPHQWV L KDMH L QR L LGHD L ZKLFK L PHWKRGL WKH L +
PLJKW L FKRRMH L WRL GHPRQWUDWHL FRPSOLDQFH L ZLWK L KRXUO \ L OLPLW L GXULQJ L SHURGV L RI L SOD
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7R L FRUHW L WKLV L GHILFLHQF \ L WKH L ([HFXALYH L 'LUHFWRU L VRXOG L DGG L &RPSOLDQ
ORQLWRULQJ L SURYLVLRQ V WKDW L VSHFLI V L D L PHWKRGL IRU L GHPRQWUDWHL QJ L RQJRLQJ L FRPSOLDQFH L
HPLWLRQ L OLPLW V L IRU L &2\ L 92& L 30 L FRQNDLQHG L LQ L WKH L SODQW V L WRL 36' L SHULW
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T 7KH L 'UDIW L 3HPLW L)DLOV L WRL \$WAXUH L &RPSOLDQFH L ZLWK L WKH L 6\WHL ,PSOPHQWV
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7LWH L 9 L SHULW L PXW L DAXUH L FRPSOLDQFH L ZLWK L DQO L DSSOLFDEOH L UHTXLUHPHQW \ L
,PSOPHQWV L 3DQ L OLPLW L >7LWH L 9 @ L SHULW L LWXHG L XQGHUL WKLV L VXEFDWSHU L WKD
HQIRUFDEOH L HPLWLRQ L OLPLW L RQJRLQV L DQG L WWDQGDUGV \ L L DQG L VXFKL RAKHUL FRQGLWRQV L DW
DAXUH L FRPSOLDQFH L ZLWK L DSSOLFDEOH L UHTXLUHPHQW L RI L WKLV L FKDSWU \ L LQFOXGLQJ L WKH L U
DSSOLFDEOH L LPSOPHQWV L RQJRLQV L SODQK ¥ L + ± L 8 L 6 L & L → + ¶ ¶ F ♂ D Q L L L
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L \$V L H[SODLQHG L LQ L GHADLO L DERYH \ L ERWK L WKH L 6,3 L RSDFLM L OLPLW L RXQG L DW T !! L
WKH L 6,3 L 30 L OLPLW L RXQG L DW T !! L 7\$& L ¶ ¶ ¶ ¶ ¶ ↑ T ♂ E Q \ L DUH L DSSOLFDEOH L UHTXLU
QRW EHQ L PRGLI LHGL WKURXJK L WKH L 6,3 L SURFHV L L L
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L &RQLQXRXL RSDFLW L PRQLWRUV L DUH L LQ L XHL DW L WKH L +DUULQWRQ L SODQW L VHW L QHL
QRU L WKH L &WDWPHQW L RI L %DVLV L SURYLGH L DQ L H[SODQDWLRQ L DV L WR L KRZ L WKHMH L RSDFLW
FRPSOLDQFH L ZLWK L WKH L 6,3 L RSDFLW L OLPLW L L &RPPhQWUV L CRWH L WKDW L DOOL RI L WKH L &RPS
ORQLWRULQJ L 6XPPDU L SURYLVRQV L ♂ 'UDWL 3HUPIW L S L T □ L DOGL 3HULRGFL L ORQLWR
SURYLVRQV L ♂ 'UDWL 3HUPIW L S L ↑ → □ L GHDO L RQO L ZLWK L + !! L &)5 L 3DUW L + !! L 1HZ L 6R
1RQH L RI L WKHMH L SURYLVRQV L DWXUH L FRPSOLDQFH L ZLWK L WKH L 30 L DOGL RSDFLW L 6,3 L DSSOLFDF
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)RU^L WKH^L IRUHJRLQJ^L UHDVRQV^L WKH^L 'UDM^L 3HUPDW^L IDLOV^L WR^L FRPSO\^L ZLWK^L WKH^L UH
7LWH^L 9^L RI^L WKH^L &CHDQ^L \$LU^L \$FWM^L L^L &RPPHQWUV^L UHTXH^L WKDW^L WKH^L ([HF^LXALYH^L 'L
GHI^L LFLHQFLHV^L GHMFULEHG^L LQ^L WKLV^L CHW^LHU^L L^L L^L

7KDQNL \RXL IRUL \RXUL DWHQLRQ L WR L WKLV L PDWHLU L SCHDVL FRQNDWL PH L LI L \RXL

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,ODQ^L /HYLQL^L
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(QYLURQPHQNDOL^L ,QWHJULW^L 3URMHFW^L
→ !! → L 5LR^L *UDQGHQ^L L - + !! !! L
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